REMARKS

Claims 17-33 are all the claims pending in the application, the claims having been editorially amended to more clearly define the invention. Reconsideration of the application and allowance of all claims are respectfully requested in view of the above amendments and the following remarks.

The claims have been amended to address the issues raised by the examiner in paragraphs 1-7 of the Office action. Since the claim amendments overcome the editorial objections and place the claims in better condition for appeal, entry is respectfully requested.

The prior art rejections stated in the remainder of the Office action are respectfully traversed for the reasons set forth below.

Claim 17 has been rejected as being unpatentable over US 6118877 (Lindemann et al.), in view of US 5321758 (Charpentier) and further in view of US 5012520 (Steeger). Lindemann is cited to show a hearing aid system for in-situ fitting of hearing aids, Steeger has been cited for showing a hearing aid with a wireless remote control to emit control signals to a hearing aid, and Charpentier has been cited for showing a power efficient hearing aid with a final attenuator, which comprises three switched resistors. Charpentier is further alleged to show that an output signal is tapped from a voltage-dividing network.

First, it is noted that in situ fitting with the hearing aid acting as an audio signal source is acknowledged as prior art in the Background discussion in the present application. While applicants disagree that Lindemann teaches in situ fitting, it is in any event the case that at best Lindemann is no more relevant in this respect than the acknowledged prior art.

In its broadest aspect, the present invention resides in the provision of a voltage dividing network that can be selectively used to either attenuate the test signal or to pass the test signal directly to the output transducer. This is clearly neither shown nor suggested in Lindemann.

Charpentier is directed to a power efficient hearing aid using a programmable biasing technique to set the quiescent operating points of amplifiers. It does include a "final attenuator" 74 for selectively attenuating the signal applied to the receiver 76, the attenuator being a number of resistors, each of them connected in series between the final amplifier and the receiver. Switches permit selecting any combination of the resistors for the purpose of adjusting the attenuation. The receiver may also be connected directly to the output of the amplifier by short-circuiting of all the resistors. This is not a voltage-dividing network.

Reference may be had to "The IEEE Standard Dictionary of Electrical and Electronics Terms", sixth Edition. Herein a "voltage divider" has been defined as "A network consisting of impedance elements connected in series, to which a voltage is applied, and from which one or more voltages can be obtained across any portion of the network".

Charpentier shows a number of resistors, all arranged in parallel. Switches may connect any one of them in series between the amplifier and the load. The resistors in the network themselves are never connected in series. It will be evident to those skilled in the art, that whereas a voltage divider divides the voltage, i.e. it offers a tap output with a voltage that is a given proportion of the voltage applied to the network, any resistor connected in series with the amplifier output will not divide the voltage applied onto it. A resistor connected in series with the amplifier output is likely to cause a voltage drop. However, this will be entirely dependent on the relationship between the respective impedances of the resistor and the load.

Now, adjustable attenuation by connecting a resistor with an adjustable effective value in series with the receiver is undesirable because the output characteristic of the receiver, compared to a solution using a voltage divider, will be more dependent on the impedance of the receiver, which is likely to depend on frequency.

A distinctive feature of the present invention may be summarized as follows. To use the hearing aid as an audio signal source for in situ fitting, the hearing aid must be capable of generating signals over a wide dynamic range. To accomplish this, the present invention provides a voltage dividing network between the sound generator and the output transducer. Lindemann does not teach in situ fitting where an audiogram is generated, but rather in situ testing of the hearing aid. In the contemplation of Lindemann, the audiogram was generated earlier and no new or modified audiogram is being generated. Lindemann does not need to generate test signals with the same dynamic range as in the present invention.

Claim 17 requires

-a hearing aid system for in-situ fitting,

-a hearing aid having a digital amplifier for amplifying an output from said signal processor,

-a control signal receiver means,

-a control device,

-a voltage dividing network adapted to cooperate with the digital amplifier so as to attenuate the test signal as fed to said output transducer, and

-switch means for optionally switching between a first position and a second position, said switch means acting in said first position to connect said voltage dividing network to

attenuate said test signal, and said switch means acting in said second position to bypass said voltage dividing network in order to feed said test signal directly to said output transducer.

The digital amplifier enables the hearing to operate in normal hearing deficit compensation mode with a high efficiency, i.e. low power consumption.

The voltage dividing network provides the hearing aid with a capability of attenuating the output, and thereby the output noise level, to a level suitable for using the hearing aid as a sound generator for in-situ fitting, i.e. the measurement of an audiogram. The voltage divider permits lowering the output level without running into distortions due to the frequency dependence of the receiver impedance.

The control signal receiver means, the control device and the switching means permit remote-controlling the hearing aid to switch between two modes of operation, attenuation mode and direct mode.

None of the cited prior art has suggested combining digital amplifiers with the use of voltage dividers. Digital amplifiers operate to control the output level over a wide dynamic range entirely by adapting the switching cycles. The use of voltage dividers in connection with digital amplifiers would compromise the efficiency of the amplifier.

Applicants have discovered that a voltage divider can serve a useful purpose in attenuating noise in the hearing aid and that the loss of efficiency by the voltage divider can be contained and kept down to an acceptable level by including in the hearing aid a switch, by which the voltage divider can be bypassed when not needed. Hereby the hearing aid can selectively be switched between a normal, low-power mode, wherein it is used as a normal

hearing aid, and a low-noise mode, wherein the hearing aid is used as an audio signal source outputting sound signals for the purpose of measuring the sensitivity of the ear.

Claim 23 has been rejected as unpatentable over Lindemann et al., Charpentier and Steeger, and further in view of USP 5,881,158 to Aceti et al. This rejection is respectfully traversed.

Aceti et al has been cited for showing a hearing aid comprising a class-D amplifier (i.e., a switching amplifier) that is power efficient in order to extend battery life of the hearing aid. Aceti has no explicit mentioning of a switching amplifier. More importantly, claim 23 by its dependency inherits all of the limitations of claim 17, and thus distinguishes over the prior art as has been explained above.

Claims 24, 25, and 27 have been rejected as unpatentable over Lindemann et al. in view of Charpentier and further in view of Steeger, and even further in view of US 5,701,106 to Pikkarainen et al. This rejection is respectfully traversed.

Pikkarainen has been cited for showing a sigma delta D/A converter wherein the advantages of the sigma delta D/A converter are high accuracy, good reliability, good stability, and good linearity. Applicants note that Pikkarainen relates to modulation performed in digital mobile telephones. More importantly, claims 24, 25, and 27 by their respective references inherit all of the limitations of claim 17, and thus distinguish over the prior art for the reasons discussed above.

Claims 28-30 and 32-33 have been rejected as unpatentable over USP 6,442,279 to Preves et al. This rejection is respectfully traversed.

Preves has been referred to for showing a hearing aid adapted for in-situ fitting, the hearing aid comprising an amplifier (as noted by the examiner, an amplifier has not been explicitly mentioned), attenuation means and an output transducer, and being adapted for selective operation in a first mode and a second mode, the amplifier being adapted to generate, in the first mode, an amplifier output signal within a first dynamic range, and to attenuate, in the second mode, the amplifier output signal so as to extend within a second dynamic range, which second dynamic range is shifted to lower levels relative to the first dynamic range.

Further, Preves has been referred to for showing that the attenuator comprises a voltage dividing resistor network, the resistor network comprising fixed value resistors. With reference to claim 33, Preves has been cited for showing a selector switch adapted to selectively connect a microphone to, or disconnect a microphone from, a processor.

Claim 28 as now amended distinguishes over Preves notably by referring to a hearing aid adapted for in-situ fitting, which hearing aid is adapted for selective operation in at least one of a first mode and a second mode, the hearing aid being adapted to operate, in the second mode, to feed to said digital amplifier a test signal. As mentioned above, in the present application, the term in-situ fitting is used consistently to refer to fitting where an audiogram is measured with the hearing aid placed in the ear and acting as an audio signal source instead of the headphone. Preves does not provide a hearing aid for in-situ fitting in this sense of the term. Neither does Preves provide a hearing aid adapted for providing a test signal.

Claims 29-30 and 32-33, by their respective dependencies, inherit the limitations of claim 28 and thereby distinguish over the cited prior art.

Applicants respectfully disagree with the examiner's characterization of Preves given with reference to claim 33. Preves shows a switch connected to selectively short-circuit a resistor arranged in the amplifier output branch. Preves does not show disconnecting the microphone from any processor.

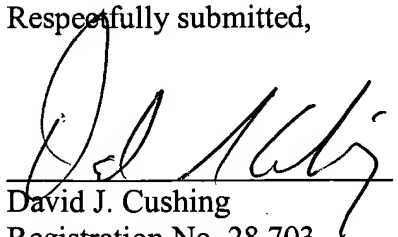
Claim 31 has been rejected as unpatentable over Preves in view of Aceti. This rejection is respectfully traversed.

Aceti has been discussed above. Claim 31 by its dependency inherits the limitations of claim 28, and thereby distinguishes over the cited prior art.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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